DOCUMENT RESUME

ED 333 943 JC 910 337

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TITLE Preparing Women and Minorities for Careers in Math and Science: The Role of Community Colleges. ERIC Digest.
INSTITUTION ERIC Clearinghouse for Junior Colleges, Los Angeles, Calif.
PUB DATE Jun 91
CONTRACT EDO-JC-91-02
NOTE 4p.
PUB TYPE Information Analyses - ERIC Clearinghouse Products (071)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; *Articulation (Education); *College Role; College School Cooperation; Community Colleges; *Females; Intercollegiate Cooperation; *Mathematics Education; *Minority Groups; Program Descriptions; School Holding Power; *Science Education; Student Recruitment; Two Year Colleges; Two Year College Students
IDENTIFIERS *ERIC Digests

ABSTRACT

Community colleges can play an important role in increasing the number of people in the scientific talent pool and diversifying its ethnic and gender composition. In an effort to recruit more women and minorities into two-year college science, math, and engineering technology programs, community colleges are engaging in a wide range of special activities, such as offering vocational counseling, internships, and scholarships, as well as sponsoring on-campus events for high school students and developing articulation agreements with secondary schools and four-year institutions. A significant proportion of colleges offer programs to encourage women and minorities to enroll in science and math, and to help them succeed. Examples include: (1) Delgado Community College's Math, Science and Technology Summer Youth Enrichment Program for minority junior high school students in Louisiana; (2) Washtenaw Community College's program to upgrade basic skills for women and minority students in Mighican; (3) Connecticut's General Hartford Community College's Pre-Nursing developmental program; (4) American River College's special bridge program, involving linkages with both high schools and universities in California; (5) California's Evergreen Valley College's program which employs an all-Hispanic team of educators and community members to improve the retention and matriculation of Hispanic students; and (6) California's Occidental College's program which brings community college students on-campus into paid science research assistantships. Recruiting women and minorities into science and math careers will require a commitment to recruitment, career guidance, provision of necessary facilities and services, and a smooth transition from two- to four-year college. (PAA)

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Preparing Women and Minorities for Careers in Math and Science: The Role of Community Colleges

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Several recent studies of the condition of math and science education at all levels have generated extreme concern about a predicted shortfall of as many as 560,000 scientists and engineers over the next twenty years, and a shortage of engineering faculty that is already being felt (National Science Board, 1986; Task Force, 1988; McDonnell, Oakes, and Shavelson, 1989; Conciatore, 1989). One of these, the National Science Board's report, *Undergraduate Science, Mathematics and Engineering Education*, considers women, Blacks, and Hispanics to be a largely untapped pool with great potential for increasing the scientific workforce of the nation.

The need for greater participation of minorities and women in science and math careers, coupled with the fact that nearly half of all minority college students attend a community college underscores the importance of establishing two-year college programs for the recruitment and retention of talented minority and women students in math and science disciplines. Community colleges already play a signficant part in educating minority students who go on to earn engineering and science doctorates; 11.8% of all minorities who earned doctorates in engineering in 1987 were graduates of two-year institutions (Conciatore, 1989, p12). However, much remains to be done.

This digest provides an overview of the literature on the community colleges' special efforts to prepare underrepresented groups for careers in math and sciences. Highlighting the scope and strategies of exemplary programs, the digest explores projects and services at community colleges, and linkages between community colleges, elementary and secondary schools, and four-year schools.

Precollege-Community College Linkages

In *A Pilot Study on Needs in the Sciences in Community Colleges*, Banks and Railsback (1988) asked community college representatives about ways that more students could be encouraged to enroll in science, mathematics, and engineering technology programs. In addition to other ideas, such as vocational counseling, internships, and scholarships, respondents supported articulation programs with high schools and junior high schools; on-campus events for high school students; tech-prep curricula with high schools; and programs to bring high school faculty to campus.

Delgado Community College (1989) in Louisiana provides one example of a successful secondary-postsecondary collaboration. Delgado runs a Math, Science and Technology Summer Youth Enrichment Program for the Orleans Parish School system. Minority junior high students who have demonstrated above average abilities in math and science are invited to participate in specially designed three-week summer mini-courses. Participants are introduced to the basics in computers, robotics, electrical systems, radio communications, and biomedical technology. The program's goals are to enhance the students' problem-solving and analytical skills; expose them to real-life science, math, and technology through field trips and speakers; offer hands-on computer experiences; and help students evaluate their career options. Interviews with the participating students confirmed that their interest in science and technology had been stimulated.

Community College Programs and Services

Almost half of the 91 colleges surveyed by Banks and Railsback offered special programs to encourage women and/or minorities to enroll in science and math programs and help them succeed. The literature indicates that such programs tend to focus on one or more of the following goals:

- ensuring that students have the basic skills needed for success in college-level math and science courses
- providing social and academic support networks
- helping students and their families afford the costs of college through scholarships, financial aid, savings programs, and other means
- providing women and minority role models and mentors from within the college and the community
- altering pedagogical approaches and curricula to accommodate students' learning styles better.

For example, Washtenaw Community College has implemented a program to upgrade the basic skills of women and minority students and provide the academic support needed for them to succeed in high technology occupational training programs (Leach and Roberts, 1988). Counseling, peer support, financial aid, and student advocacy are important components for ensuring student persistence.

Greater Hartford Community College also offers a developmental science-oriented program for minority students (Williams and Cox, 1991). The Pre-Nursing program is a full-time, 15-week, non-credit, pass/fail remedial sequence offered each spring to prepare students to enter the associate degree nursing program. Pre-Nursing includes courses in

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communication skills, mathematics, science, and an introduction to nursing. The students learn to overcome cultural barriers, improve decision making, and value academic achievement. Financial support is provided for students throughout the pre-nursing and associate degree programs.

American River College in the Los Rios Community College District in California implemented the Mathematics, Engineering, and Science Achievement/Minority Engineering Program (MESA/MEP) to serve as a bridge between high school MESA programs and university MEP programs (Lee, 1990). MESA/MEP activities include scholarships, awards, and honors; leadership development efforts; recruitment of Black, Hispanic, and Native American students; enrichment programs, such as tours to universities and resume workshops; and support services, including weekly meetings, study halls, and class clustering.

Evergreen Valley College's ENLACE program involves an all-Hispanic team of educators and community members in efforts to improve the retention and matriculation of Hispanic students (Chavez and Maestes-Flores, 1991). Because mathematical skills lie at the heart of student success in the general education/transfer curriculum, ENLACE provides students with individualized, nontraditional counseling, core mathematics courses, and contact with Hispanic mentors from such professions as engineering, computer science, medicine, accounting, and business management. These professionals are invited to class to lecture on applied mathematics, explain how math relates to their professional area, and participate in small-group problem-solving sessions with students.

Linkages with Four-Year Institutions

The Task Force on Women, Minorities, and the Handicapped in Science and Technology has recommended the formation of partnerships between two-year colleges with significant minority enrollments and four-year institutions as another means of involving underrepresented groups in scientific and technical fields. Such linkages include:

- program and course articulation
- recruitment and outreach campaigns from the university to the community college
- programs to afford two-year college students hands-on experience with the more sophisticated and specialized equipment found in university labs.

An example of this last type of program is the Community College Summer Research Program involving the Los Angeles Community College District, Glendale Community College, and Occidental College, a four-year liberal arts college (Devarics, 1989; Alexander, 1989). Since 1984, Occidental has offered two-year college students, mostly minorities and women, the opportunity to engage in research on a for-pay basis. Paired with one Occidental student, each community college student performs experiments related to an Occidental professor's principal research in such fields as chemistry, biology, and geology. The founder of the research program, Chris Craney, contends that a relationship exists between students doing research and deciding what aspect of science to enter. All 30 of the students who had participated in the program as of November 1989 had gone on to complete degrees at Occidental or other four-year colleges.

Conclusion

Community colleges are in a unique position to increase the number of people in the scientific talent pool and to diversify its ethnic and gender composition. Doing so will require a serious commitment to recruiting talented students, encouraging them to pursue science and math careers, providing necessary facilities and academic services, and ensuring a smooth transition from the two-year to four-year college.

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